

United States Patent [19]

Deetman

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[54] STABILIZED PHOSPHATE ESTER-BASED FUNCTIONAL FLUID COMPOSITIONS

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 897,189, Jun. 11, 1992, abandoned.

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[58] Field of Search 252/75, 78.5, 73, 252/46.7, 49.8, 49.9

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[57] ABSTRACT

A fluid composition suitable for use as an aircraft hydraulic fluid is disclosed. The fluid composition comprises a fire resistant phosphate ester base stock comprising between about 10% and about 100% by weight of a trialkyl phosphate, between about 0% and about 70% by weight of a dialkyl aryl phosphate, and from about 0% to about 25% by weight of an alkyl diaryl phosphate, with the proviso that the sum of the proportionate amount of each base stock component must equal 100%. The alkyl substituents of the trialkyl phosphate, the dialkyl aryl phosphate, and the alkyl diaryl phosphate contain between 3 and 8 carbon atoms, preferably between 4 and 8 carbon atoms, more preferably between 4 and 5 carbon atoms, and are bonded to the phosphate moiety via a primary carbon. It is still further preferred that the alkyl substituents of the trialkyl phosphate, the dialkyl aryl phosphate, and the alkyl diaryl phosphate are isoalkyl groups. The fluid composition further comprises an acid scavenger, an anti-erosion additive, a viscosity index improver, and an antioxidant. A novel additive combination comprises a high molecular weight butyl/hexyl methacrylate viscosity index improver, a perfluoroalkylsulfonate anti-erosion additive, a 3,4-epoxycyclohexanecarboxylate or a diepoxide acid scavenger, a di(alkylphenyl)amine, and a phenolic antioxidant comprising a mixture of a 2,4,6-trialkylphenol and a hindered polyphenol compound selected from the group consisting of bis(3,5-dialkyl-4-hydroxyaryl)methane, 1,3,5-trialkyl-2,4,6-tris(3,5-di-tert-butyl-4-hydroxyaryl)benzene and mixtures thereof. Preferably, the fluid composition further comprises a benzotriazole derivative as a copper corrosion inhibitor, and a 4,5-dihydroimidazole derivative, as an iron corrosion inhibitor and to enhance the stability of the fluid.

89 Claims, 13 Drawing Sheets

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